

# $\pi(1800)$

 $I^G(J^{PC}) = 1^-(0^{-+})$ 

See also minireview under non- $q\bar{q}$  candidates in PDG 06, Journal of Physics, G **33** 1 (2006).

NODE=M075

NODE=M075

NODE=M075M

NODE=M075M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>1812±12 OUR AVERAGE</b>		Error includes scale factor of 2.3. See the ideogram below.			
1785± 9±12	420k	ALEKSEEV	10	COMP	190 $\pi^- Pb \rightarrow \pi^- \pi^- \pi^+ Pb'$
1876±18±16	4k	EUGENIO	08	B852	18 $\pi^- p \rightarrow \eta \eta \pi^- p$
1774±18±20		CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$
1863± 9±10		CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$
1840±10±10	1200	AMELIN	96B	VES	37 $\pi^- A \rightarrow \eta \eta \pi^- A$
1775± 7±10		AMELIN	95B	VES	36 $\pi^- A \rightarrow \pi^+ \pi^- \pi^- A$
1790±14		BERDNIKOV	94	VES	37 $\pi^- A \rightarrow K^+ K^- \pi^- A$
1873±33±20		BELADIDZE	92C	VES	36 $\pi^- Be \rightarrow \pi^- \eta' \eta Be$
1814±10±23	426 ± 57	BITYUKOV	91	VES	36 $\pi^- C \rightarrow \pi^- \eta \eta C$
1770±30	1100	BELLINI	82	SPEC	40 $\pi^- A \rightarrow 3\pi A$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1737± 5±15		AMELIN	99	VES	37 $\pi^- A \rightarrow \omega \pi^- \pi^0 A^*$

1 From a single-pole fit.

2 In the  $f_0(980)\pi$  wave.3 In the  $f_0(500)\pi$  wave.4 From a fit to  $J^{PC} = 0^{-+}$   $f_0(980)\pi$ ,  $f_0(1370)\pi$  waves.5 From a fit to  $J^{PC} = 0^{-+}$   $K_0^*(1430)K^-$  and  $f_0(980)\pi^-$  waves.

NODE=M075M;LINKAGE=SP

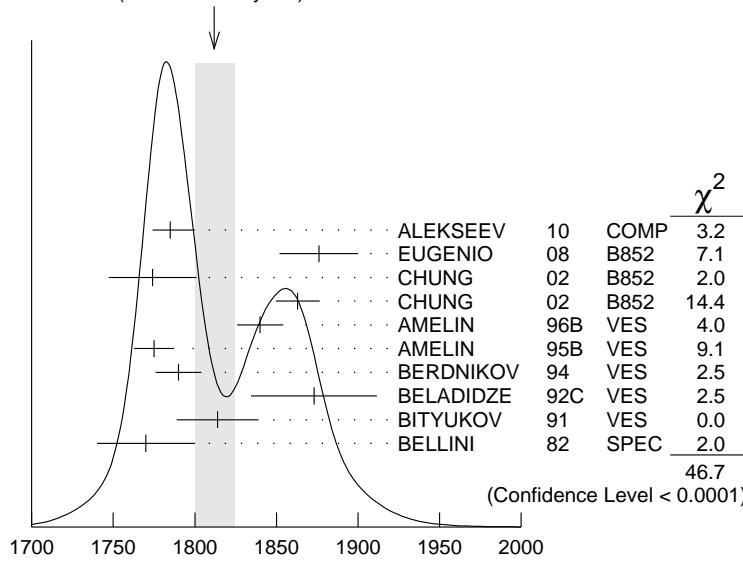
NODE=M075M;LINKAGE=C1

NODE=M075M;LINKAGE=C2

NODE=M075M;LINKAGE=AX

NODE=M075M;LINKAGE=A

WEIGHTED AVERAGE  
1812±12 (Error scaled by 2.3)

 $\pi(1800)$  mass (MeV)

## $\pi(1800)$ WIDTH

NODE=M075W

NODE=M075W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>208±12 OUR AVERAGE</b>		Error includes scale factor of 2.3. See the ideogram below.			
208±22±21	420k	ALEKSEEV	10	COMP	190 $\pi^- Pb \rightarrow \pi^- \pi^- \pi^+ Pb'$
221±26±38	4k	EUGENIO	08	B852	18 $\pi^- p \rightarrow \eta \eta \pi^- p$
223±48±50		CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$

191±21±20		<sup>8</sup> CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$	OCCUR=2
210±30±30	1200	AMELIN	96B	VES	— 37 $\pi^- A \rightarrow \eta \eta \pi^- A$	
190±15±15		<sup>9</sup> AMELIN	95B	VES	— 36 $\pi^- A \rightarrow \pi^+ \pi^- \pi^- A$	
210±70		<sup>10</sup> BERDNIKOV	94	VES	— 37 $\pi^- A \rightarrow K^+ K^- \pi^- A$	
225±35±20		BELADIDZE	92C	VES	— 36 $\pi^- Be \rightarrow \pi^- \eta' \eta Be$	
205±18±32	426 ± 57	BITYUKOV	91	VES	— 36 $\pi^- C \rightarrow \pi^- \eta \eta C$	
310±50	1100	BELLINI	82	SPEC	— 40 $\pi^- A \rightarrow 3\pi A$	
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>						
259±19± 6		AMELIN	99	VES	37 $\pi^- A \rightarrow \omega \pi^- \pi^0 A^*$	
6 From a single-pole fit.						
7 In the $f_0(980)\pi^-$ wave.						
8 In the $f_0(500)\pi^-$ wave.						
9 From a fit to $J^{PC} = 0^- + f_0(980)\pi, f_0(1370)\pi$ waves.						
10 From a fit to $J^{PC} = 0^- + K_0^*(1430)K^-$ and $f_0(980)\pi^-$ waves.						

### $\pi(1800)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1 \pi^+ \pi^- \pi^-$	seen
$\Gamma_2 f_0(500)\pi^-$	seen
$\Gamma_3 f_0(980)\pi^-$	seen
$\Gamma_4 f_0(1370)\pi^-$	seen
$\Gamma_5 f_0(1500)\pi^-$	not seen
$\Gamma_6 \rho \pi^-$	not seen
$\Gamma_7 \eta \eta \pi^-$	seen
$\Gamma_8 a_0(980)\eta$	seen
$\Gamma_9 a_2(1320)\eta$	not seen
$\Gamma_{10} f_2(1270)\pi$	not seen
$\Gamma_{11} f_0(1370)\pi^-$	not seen
$\Gamma_{12} f_0(1500)\pi^-$	seen
$\Gamma_{13} \eta \eta'(958)\pi^-$	seen
$\Gamma_{14} K_0^*(1430)K^-$	seen
$\Gamma_{15} K^*(892)K^-$	not seen

### $\pi(1800)$ BRANCHING RATIOS

$\Gamma(f_0(980)\pi^-)/\Gamma(f_0(500)\pi^-)$	$\Gamma_3/\Gamma_2$		
VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.44±0.08±0.38</b>	11 CHUNG	02	B852 18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$

$\Gamma(f_0(980)\pi^-)/\Gamma(f_0(1370)\pi^-)$	$\Gamma_3/\Gamma_4$			
VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>				
1.7±1.3	12 AMELIN	95B	VES	— 36 $\pi^- A \rightarrow \pi^+ \pi^- \pi^- A$

$\Gamma(f_0(1370)\pi^-)/\Gamma_{\text{total}}$	$\Gamma_4/\Gamma$			
VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<b>seen</b>	BELLINI	82	SPEC	— 40 $\pi^- A \rightarrow 3\pi A$

$\Gamma(f_0(1500)\pi^-)/\Gamma_{\text{total}}$	$\Gamma_5/\Gamma$		
VALUE	DOCUMENT ID	TECN	COMMENT
<b>not seen</b>	CHUNG	02	B852 18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$

$\Gamma(\rho \pi^-)/\Gamma_{\text{total}}$	$\Gamma_6/\Gamma$			
VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<b>not seen</b>	BELLINI	82	SPEC	— 40 $\pi^- A \rightarrow 3\pi A$

NODE=M075W;LINKAGE=SP  
NODE=M075W;LINKAGE=C1  
NODE=M075W;LINKAGE=C2  
NODE=M075W;LINKAGE=AX  
NODE=M075W;LINKAGE=A

NODE=M075215;NODE=M075

DESIG=10;OUR EST;→ UNCHECKED ←  
DESIG=11;OUR EST;→ UNCHECKED ←  
DESIG=3;OUR EST;→ UNCHECKED ←  
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DESIG=12  
DESIG=2  
DESIG=7;OUR EST;→ UNCHECKED ←  
DESIG=5;OUR EST;→ UNCHECKED ←  
DESIG=13  
DESIG=14  
DESIG=15  
DESIG=6;OUR EST;→ UNCHECKED ←  
DESIG=8;OUR EST;→ UNCHECKED ←  
DESIG=4  
DESIG=9

NODE=M075220

NODE=M075R11  
NODE=M075R11

NODE=M075R5  
NODE=M075R5

NODE=M075R1  
NODE=M075R1

NODE=M075R12  
NODE=M075R12

NODE=M075R2  
NODE=M075R2

$\Gamma(\rho\pi^-)/\Gamma(f_0(980)\pi^-)$ 

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	$\Gamma_6/\Gamma_3$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.25		CHUNG 02	B852		$18.3 \pi^- p \rightarrow \pi^+ \pi^- \pi^- p$	
<0.14	90	AMELIN 95B	VES	-	$36 \pi^- A \rightarrow \pi^+ \pi^- \pi^- A$	

 $\Gamma(\eta\eta\pi^-)/\Gamma(\pi^+\pi^-\pi^-)$ 

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	$\Gamma_7/\Gamma_1$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$0.5 \pm 0.1$	1200	$^{12}_{}$ AMELIN	96B VES	-	$37 \pi^- A \rightarrow \eta\eta\pi^- A$	

 $\Gamma(a_2(1320)\eta)/\Gamma_{\text{total}}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_9/\Gamma$
<b>not seen</b>	EUGENIO 08	B852	$18 \pi^- p \rightarrow \eta\eta\pi^- p$	NODE=M075R13 NODE=M075R13

 $\Gamma(f_2(1270)\pi)/\Gamma_{\text{total}}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_{10}/\Gamma$
<b>not seen</b>	EUGENIO 08	B852	$18 \pi^- p \rightarrow \eta\eta\pi^- p$	NODE=M075R14 NODE=M075R14

 $\Gamma(f_0(1370)\pi^-)/\Gamma_{\text{total}}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_{11}/\Gamma$
<b>not seen</b>	EUGENIO 08	B852	$18 \pi^- p \rightarrow \eta\eta\pi^- p$	NODE=M075R15 NODE=M075R15

 $\Gamma(f_0(1500)\pi^-)/\Gamma(a_0(980)\eta)$ 

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	$\Gamma_{12}/\Gamma_8$
• • • We do not use the following data for averages, fits, limits, etc. • • •						

0.48 $\pm 0.17$	4k	$^{12,13}$ EUGENIO	08	B852	-	$18 \pi^- p \rightarrow \eta\eta\pi^- p$
$0.030^{+0.014}_{-0.011}$		$^{12}$ ANISOVICH	01B	SPEC	0	$0.6 - 1.94 p\bar{p} \rightarrow \eta\eta\pi^0\pi^0$
0.08 $\pm 0.03$	1200	$^{12,14}$ AMELIN	96B	VES	-	$37 \pi^- A \rightarrow \eta\eta\pi^- A$

 $\Gamma(\eta\eta'(958)\pi^-)/\Gamma(\eta\eta\pi^-)$ 

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	$\Gamma_{13}/\Gamma_7$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.29 $\pm 0.07$		$^{12}$ BELADIDZE	92C VES	-	$36 \pi^- Be \rightarrow \pi^- \eta' \eta Be$	
0.3 $\pm 0.1$	426 $\pm 57$	$^{12}$ BITYUKOV	91 VES	-	$36 \pi^- C \rightarrow \pi^- \eta \eta C$	

 $\Gamma(K_0^*(1430)K^-)/\Gamma_{\text{total}}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	$\Gamma_{14}/\Gamma$
<b>seen</b>	BERDNIKOV 94	VES	-	$37 \pi^- A \rightarrow K^+ K^- \pi^- A$	NODE=M075R4 NODE=M075R4

 $\Gamma(K^*(892)K^-)/\Gamma_{\text{total}}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	$\Gamma_{15}/\Gamma$
<b>not seen</b>	BERDNIKOV 94	VES	-	$37 \pi^- A \rightarrow K^+ K^- \pi^- A$	NODE=M075R9 NODE=M075R9

11 Assuming that  $f_0(980)$  decays only to  $\pi\pi$ .

12 Systematic errors not estimated.

13 From a single-pole fit.

14 Assuming that  $f_0(1500)$  decays only to  $\eta\eta$  and  $a_0(980)$  decays only to  $\eta\pi$ .

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 **$\pi(1800)$  REFERENCES**

ALEKSEEV 10	PRL 104 241803	M.G. Alekseev <i>et al.</i>	(COMPASS Collab.)
EUGENIO 08	PL B660 466	P. Eugenio <i>et al.</i>	(BNL E852 Collab.)
PDG 06	JPG 33 1	W.-M. Yao <i>et al.</i>	(PDG Collab.)
CHUNG 02	PR D65 072001	S.U. Chung <i>et al.</i>	(BNL E852 Collab.)
ANISOVICH 01B	PL B500 222	A.V. Anisovich <i>et al.</i>	
AMELIN 99	PAN 62 445	D.V. Amelin <i>et al.</i>	(VES Collab.)
	Translated from YAF 62 487.		
AMELIN 96B	PAN 59 976	D.V. Amelin <i>et al.</i>	(SERP, TBIL) IGJPC
	Translated from YAF 59 1021.		
AMELIN 95B	PL B356 595	D.V. Amelin <i>et al.</i>	(SERP, TBIL)
BERDNIKOV 94	PL B337 219	E.B. Berdnikov <i>et al.</i>	(SERP, TBIL)
BELADIDZE 92C	SJNP 55 1535	G.M. Beladidze, S.I. Bityukov, G.V. Borisov	(SERP+)
	Translated from YAF 55 2748.		
BITYUKOV 91	PL B268 137	S.I. Bityukov <i>et al.</i>	(SERP, TBIL)
BELLINI 82	PRL 48 1697	G. Bellini <i>et al.</i>	(MILA, BGNA, JINR)

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NODE=M075R6  
NODE=M075R6NODE=M075R8  
NODE=M075R8NODE=M075R13  
NODE=M075R13NODE=M075R14  
NODE=M075R14NODE=M075R15  
NODE=M075R15NODE=M075R10  
NODE=M075R10NODE=M075R4  
NODE=M075R4NODE=M075R9  
NODE=M075R9NODE=M075R;LINKAGE=CK  
NODE=M075R5;LINKAGE=NS  
NODE=M075R7;LINKAGE=SP  
NODE=M075R7;LINKAGE=A

NODE=M075

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REFID=52160  
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